

# Advances in Software Defined Networking and Network Functions Virtualization

## ► ZHANG Honggang



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Software defined networking (SDN) and network functions virtualization (NFV) are being heralded as a fundamental leap forward, which will substantially transform the landscape of the whole telecommunications and networks area. A number of key technical advancements for network softwarization and virtualization, commoditizing networking hardware, simplifying operations, and reducing capital and operational expenditures have been quickly emerging on the fronts.

Basically, decoupling the control plane from the data plane as well as decoupling the network functions from the hardware implementation using virtualization and service abstraction possess distinctive networking flexibility and capability, but also point to a number of functional and operational challenges.

The key target of this special issue is to cover the broad “spectra” of SDN and NFV technologies from various perspectives, ranging from NFV-based emulation platform to inter-domain SDN as well as from Distributed Denial of Service (DDoS) attacks to evolutionary algorithms in software defined networks.

The first article, by LI Haifeng, LI Taixin, and ZHANG Hongke, “A Large-Scale NFV-Based Emulation Platform for Smart Identifier Network” describes a large-scale emulation platform for the proposed Smart Identifier Network (SINET). Specifically, the authors pool and virtualize all hardware resources based on lightweight virtualization technologies, achieving flexibly programmable and dynamically configurable emulation platform via designing the controller and orchestrators to manage emulation tasks and to collect emulation results.

The next article “Survey of Mechanisms for Inter-Domain SDN” by WANG Yangyang and BI Jun highlights the major approaches for extending the SDN mechanism to the inter-domain stages. The deployment of inter-domain SDN and relevant technical problems are discussed with details. Moreover, the authors explain potential applications and technical challenges in various inter-domain SDN scenarios.

The third article “DDoS Attack in Software Defined Networks: A Survey” by XU Xiaoqiong, YU Hongfang, and YANG Kun provides an in-depth survey on how to take advantage of SDN techniques to solve DDoS threats to Internet security. Concretely, various SDN-supported mechanisms against DDoS attacks are introduced via a systematic review of the existing literatures.

Finally, the article titled “Evolutionary Algorithms in Software Defined Networks: Techniques, Applications, and Issues” by LIAO Lingxia, Victor C. M. Leung, and LAI Chin-Feng introduces four types of evolutionary algorithms (EAs): Genetic Algorithms, Particle Swarm Optimization, Ant Colony Optimization, and Simulated Annealing, which can be widely applied to dealing with the complex optimization problems for huge scale of SDN networks. Within the framework of SDN, these four types of EAs are presented by illustrating their key techniques, summarizing their typical applications, and highlighting their future challenges.

We would like to thank all authors for their significant contributions. It is hoped that the articles in this issue will surely stimulate more and more readers of *ZTE Communications* to actively take part in this promising research area from now on.